

Amendments to the Claims

The following listing of claims will replace all prior versions, and listings, of claims in the ancestor application.

1. (Currently Amended) A method for processing a speech signal, comprising:

receiving an input speech signal;
constructing a phoneme lattice for the input speech signal;
searching the phoneme lattice to produce a likelihood score for each potential path; and
determining a processing result for the input speech signal based on the likelihood score of each potential path;

wherein constructing the phoneme lattice includes:

segmenting an input speech signal into frames,
extracting acoustic features for a frame of the input speech signal,
determining K-best initial phoneme paths leading to the frame
based on a first score of each potential phoneme path leading to the
frame, and
calculating a second score for each of the K-best phoneme paths
for the frame.

2. (Cancelled)

3. (Currently Amended) The method of ~~claim 2~~ claim 1, further comprising:
clustering together K-best initial phoneme paths for at least one consecutive frame;
selecting M-best refined phoneme paths among the clustered phoneme paths based on second scores of these paths; and
identifying vertices and arc parameters of the phoneme lattice for the input speech signal.

4. (Currently Amended) The method of ~~claim 2~~ claim 1, wherein the first score and the second score comprise a score based on phoneme acoustic models and language models.

5. (Original) The method of claim 1, wherein searching the phoneme lattice comprises:

- receiving a phoneme lattice;
- traversing the phoneme lattice via potential paths;
- computing a score for a traversed path based on at least one of a phoneme confusion matrix and a plurality of language models; and
- modifying the score for the traversed path.

6. (Original) The method of claim 5, wherein modifying the score comprises adjusting the score by at least one of the following: allowing repetition of phonemes and allowing flexible endpoints for phonemes in a path.

7. (Original) The method of claim 1, wherein determining the processing result comprises determining at least one of the following: at least one candidate textual representation of the input speech signal and a likelihood that the input speech signal contains targeted keywords.

8-14. (Cancelled)

15. (Currently Amended) A method for distributing speech processing, comprising:

- receiving an input speech signal by a client;
- constructing a phoneme lattice for the input speech signal by the client;
- transmitting the phoneme lattice from the client to a server; and
- searching the phoneme lattice to produce a result for the input speech signal for the purpose of at least one of recognizing speech and spotting keywords, in the input speech signal: signal;

wherein constructing the phoneme lattice includes:

segmenting an input speech signal into frames,

extracting acoustic features for a frame of the input speech signal,

determining K-best initial phoneme paths leading to the frame

based on a first score of each potential phoneme path leading to the frame, and

calculating a second score for each of the K-best phoneme paths.

16. (Cancelled)

17. (Currently Amended) The method of ~~claim 16~~ claim 15, further comprising:

clustering together K-best initial phoneme paths for at least one consecutive frame;

selecting M-best refined phoneme paths among the clustered phoneme paths based on second scores of these paths; and

identifying vertices and arc parameters of the phoneme lattice for the input speech signal.

18. (Currently Amended) The method of ~~claim 16~~ claim 15, wherein the first score and the second score comprise a score based on phoneme acoustic models and phoneme language models.

19. (Original) The method for claim 15, wherein searching the phoneme lattice comprises:

receiving a phoneme lattice;

traversing the phoneme lattice via potential paths;

computing a likelihood score for a traversed path based on at least a phoneme confusion matrix and a plurality of language models;

modifying the score for the traversed path; and

determining a search result for the input audio signal based on the modified score of each searched path.

20. (Original) The method of claim 19, wherein modifying the score comprises adjusting the score by at least one of the following: allowing repetition of phonemes and allowing flexible endpoints for phonemes in a path.

21-23. (Cancelled)

24. (Currently Amended) A speech processing system, comprising:
a phoneme lattice constructor to construct a phoneme lattice for an input speech signal;
a phoneme lattice search mechanism to search the phoneme lattice for the purpose of at least of recognizing speech and spotting keywords, in the input speech signal;
a plurality of models for lattice construction; and
a plurality of models for lattice ~~search~~ search;
wherein the phoneme lattice constructor includes:
an acoustic feature extractor to segment the input speech signal into frames and to extract acoustic features for a frame,
a phoneme path estimator to determine K-best initial phoneme paths leading to the frame,
a global score evaluator to determine M-best refined phoneme paths based on a cluster of K-best paths of at least one consecutive frame, and
a lattice parameter identifier to identify lattice vertices and arc parameters based on M-best refined phoneme paths of each frame.

25. (Cancelled)

26. (Original) The system of claim 24, wherein the plurality of models for lattice construction comprise a plurality of phoneme acoustic models and a plurality of language models.

27. (Original) The system of claim 24, wherein the plurality of models for lattice search comprise a phoneme confusion matrix and a plurality of language models.

28-30. (Cancelled)

31. (Original) A distributed speech processing system, comprising:
a client to receive an input speech signal and to construct a phoneme lattice for the input speech signal; and
a server to search the phoneme lattice to produce a result for the input speech signal for the purpose of at least one of recognizing speech and spotting keywords, in the input speech signal.

32. (Original) The system of claim 31, wherein the client comprises a phoneme lattice constructor to construct a phoneme lattice and a transmitting component to transmit the phoneme lattice to the server.

33. (Original) The system of claim 31, wherein the server comprises a receiving component to receive the phoneme lattice from the client and a phoneme lattice search mechanism to search the phoneme lattice.

34-36. (Cancelled)

37. (Currently Amended) An article comprising: a machine accessible medium having content stored thereon, wherein when the content is accessed by a processor, the content provides for processing a speech signal by:
receiving an input speech signal;

constructing a phoneme lattice for the input speech signal;
searching the phoneme lattice to produce a likelihood score for each potential path; and
determining a processing result for the input speech signal based on the likelihood score of each potential ~~path~~ path;
wherein constructing the phoneme lattice includes:
segmenting an input speech signal into frames,
extracting acoustic features for a frame of the input speech signal,
determining K-best initial phoneme paths leading to the frame
based on a first score of each potential phoneme path leading to the
frame, and
calculating a second score for each of the K-best phoneme paths for the
frame.

38. (Cancelled)

39. (Currently Amended) The article of ~~claim 38~~ claim 37, further comprising content for:

clustering together K-best initial phoneme paths for at least one consecutive frame;

selecting M-best refined phoneme paths among the clustered phoneme paths based on second scores of these paths; and

identifying vertices and arc parameters of the phoneme lattice for the input speech signal.

40. (Currently Amended) The article of ~~claim 38~~ claim 37, wherein the first score and the second score comprise a score based on phoneme acoustic models and language models.

41. (Original) The article of claim 37, wherein content for searching the phoneme lattice comprises content for:

receiving a phoneme lattice;
traversing the phoneme lattice via potential paths;
computing a score for a traversed path based on at least one of a
phoneme confusion matrix and a plurality of language models; and
modifying the score for the traversed path.

42. (Original) The article of claim 41, wherein content for modifying the score comprises content for adjusting the score by at least one of the following: allowing repetition of phonemes and allowing flexible endpoints for phonemes in a path.

43. (Original) The article of claim 37, wherein content for determining the processing result comprises content for determining at least one of the following: at least one candidate textual representation of the input speech signal and a likelihood that the input speech signal contains targeted keywords.

44-50. (Cancelled)

51. (Currently Amended) An article comprising: a machine accessible medium having content stored thereon, wherein when the content is accessed by a processor, the content provides for distributing speech processing by:

receiving an input speech signal by a client;
constructing a phoneme lattice for the input speech signal by the client;
transmitting the phoneme lattice from the client to a server; and
searching the phoneme lattice to produce a result for the input speech signal for the purpose of at least one of recognizing speech and spotting keywords, in the input speech signal- signal;

wherein constructing the phoneme lattice includes:

segmenting an input speech signal into frames,

extracting acoustic features for a frame of the input speech signal,

determining K-best initial phoneme paths leading to the frame
based on a first score of each potential phoneme path leading to the
frame, and
calculating a second score for each of the K-best phoneme paths.

52. (Cancelled)

53. (Currently Amended) The article of ~~claim 52~~ claim 51, further comprising content for:

clustering together K-best initial phoneme paths for at least one consecutive frame;

selecting M-best refined phoneme paths among the clustered phoneme paths based on second scores of these paths; and

identifying vertices and arc parameters of the phoneme lattice for the input speech signal.

54. (Currently Amended) The article of ~~claim 52~~ claim 51, wherein the first score and the second score comprise a score based on phoneme acoustic models and phoneme language models.

55. (Original) The article for claim 51, wherein content for searching the phoneme lattice comprises content for:

receiving a phoneme lattice;

traversing the phoneme lattice via potential paths;

computing a likelihood score for a traversed path based on at least a phoneme confusion matrix and a plurality of language models;

modifying the score for the traversed path; and

determining a search result for the input audio signal based on the modified score of each searched path.

56. (Original) The article of claim 55, wherein content for modifying the score comprises content for adjusting the score by at least one of the following: allowing repetition of phonemes and allowing flexible endpoints for phonemes in a path.

57-59. (Cancelled)